June 17, 2019

NG-19-0084
10 CFR 50.73

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Duane Arnold Energy Center
Docket 50-331
Renewed Op. License No. DPR-49

Licensee Event Report 2019-001

Please find attached the subject report submitted in accordance with 10 CFR 50.73. This letter makes no new commitments or changes to any existing commitments.

Dean Curtland
Site Director, Duane Arnold Energy Center
NextEra Energy Duane Arnold, LLC

cc: Administrator, Region III, USNRC
Project Manager, DAEC, USNRC
Resident Inspector, DAEC, USNRC

IE22
NRR

NRC FORM 366 (04-2018) U.S. NUCLEAR REGULATORY COMMISSION

# LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)



| 1. Facility Name | 2. Docket Number | 3. Page |
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**4. Title**
Manual Reactor Scram Due to Lowering Reactor Water Level

| 5. Event Date | | | 6. LER Number | | | 7. Report Date | | | 8. Other Facilities Involved | |
|---|---|---|---|---|---|---|---|---|---|---|
| Month | Day | Year | Year | Sequential Number | Rev No. | Month | Day | Year | Facility Name | Docket Number |
| | | | | | | | | | N/A | N/A |
| 4 | 20 | 2019 | 2019 | 0001 | 00 | 6 | 17 | 2019 | Facility Name | Docket Number |
| | | | | | | | | | N/A | N/A |

| 9. Operating Mode | 11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: *(Check all that apply)* | | | |
|---|---|---|---|---|
| 1 | ☐ 20.2201(b) | ☐ 20.2203(a)(3)(i) | ☐ 50.73(a)(2)(ii)(A) | ☐ 50.73(a)(2)(viii)(A) |
| | ☐ 20.2201(d) | ☐ 20.2203(a)(3)(ii) | ☐ 50.73(a)(2)(ii)(B) | ☐ 50.73(a)(2)(viii)(B) |
| | ☐ 20.2203(a)(1) | ☐ 20.2203(a)(4) | ☐ 50.73(a)(2)(iii) | ☐ 50.73(a)(2)(ix)(A) |
| | ☐ 20.2203(a)(2)(i) | ☐ 50.36(c)(1)(i)(A) | ☒ 50.73(a)(2)(iv)(A) | ☐ 50.73(a)(2)(x) |
| 10. Power Level | ☐ 20.2203(a)(2)(ii) | ☐ 50.36(c)(1)(ii)(A) | ☐ 50.73(a)(2)(v)(A) | ☐ 73.71(a)(4) |
| | ☐ 20.2203(a)(2)(iii) | ☐ 50.36(c)(2) | ☐ 50.73(a)(2)(v)(B) | ☐ 73.71(a)(5) |
| 100% | ☐ 20.2203(a)(2)(iv) | ☐ 50.46(a)(3)(ii) | ☐ 50.73(a)(2)(v)(C) | ☐ 73.77(a)(1) |
| | ☐ 20.2203(a)(2)(v) | ☐ 50.73(a)(2)(i)(A) | ☐ 50.73(a)(2)(v)(D) | ☐ 73.77(a)(2)(ii) |
| | ☐ 20.2203(a)(2)(vi) | ☐ 50.73(a)(2)(i)(B) | ☐ 50.73(a)(2)(vii) | ☐ 73.77(a)(2)(iii) |
| | | ☐ 50.73(a)(2)(i)(C) | ☐ Other (Specify in Abstract below or in NRC Form 366A | |

**12. Licensee Contact for this LER**

| Licensee Contact | Telephone Number (Include Area Code) |
|---|---|
| Bob Murrell, Licensing Engineer | 319-851-7900 |

**13. Complete One Line for each Component Failure Described in this Report**

| Cause | System | Component | Manufacturer | Reportable To ICES | Cause | System | Component | Manufacturer | Reportable To ICES |
|---|---|---|---|---|---|---|---|---|---|
| B | LD | FLT | N/A | Y | N/A | N/A | N/A | N/A | N/A |

| 14. Supplemental Report Expected | 15. Expected Submission Date | Month | Day | Year |
|---|---|---|---|---|
| ☐ Yes (If yes, complete 15. Expected Submission Date) ☒ No | | N/A | N/A | N/A |

Abstract (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)

On April 20, 2019, while operating at 100% power, NextEra Energy Duane Arnold (DAEC) experienced a trip of both reactor feed pumps due to a loss of suction pressure. As a result, plant operators inserted a manual scram. All control rods inserted, as required. As a result of the feed pump trips and scram, the High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) automatically injected. In addition, containment isolations occurred, as expected for this event. This resulted in a 4-hour event report to the NRC under 10 CFR 50.72 section 50.72(b)(2)(iv)(A) - ECCS Injection, 50.72(b)(2)(iv)(B) - RPS Actuation – Critical, 50.72(b)(3)(iv)(A) - Valid Specific System Actuation (reference EN#54012). The root cause of this event was brittle fracture of a condensate demineralizer in-line air filter bowl due to heat related age degradation. This event was of very low safety significance and had no impact on public health or safety. There were no systems, structures, or components inoperable at the time of the event and none that contributed to the event. This event is reportable pursuant to 10 CFR 50.73(a)(2)(iv)(A). In addition to the event that occurred on April 20, 2019, this LER is reporting a related event that occurred on April 21, 2019 that resulted in an invalid Primary Containment Isolation System. There were no radiological releases associated with either of these event.

| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. LER NUMBER | | |
|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REV NO. |
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NARRATIVE

## I. Description of Event:

On April 20, 2019, while operating at 100% power, DAEC experienced a trip of both reactor feed pumps. As a result, plant operators inserted a manual scram. All control rods inserted, as required. As a result of the feed pump trips and scram, HPCI and RCIC automatically injected. Also, containment isolations occurred, as expected for this event. This resulted in a 4-hour event report to the NRC under 10 CFR 50.72 section 50.72(b)(2)(iv)(A) - ECCS Injection, 50.72(b)(2)(iv)(B) - RPS Actuation – Critical, 50.72(b)(3)(iv)(A) - Valid Specific System Actuation (reference EN#54012).

The reactor feedwater pumps tripped on low suction pressure. The low suction pressure condition was caused by the condensate filter effluent valves from the condensate demineralizers going closed due to a loss of instrument air to condensate filter demineralizer control panel 1C80.

The direct cause of the loss of instrument air pressure was the catastrophic failure of the in-line air filter bowl located upstream of PCV-80 (internal to 1C80).

In addition to the event that occurred on April 20, 2019, this LER is reporting a related event that occurred on April 21, 2019 that resulted in an invalid PCIS. Specifically, on April 21, 2019, at 1101, an invalid Primary Containment Isolation System (PCIS) Group 1 isolation initiated. This isolation occurred while taking the reactor Mode Switch from Shutdown to Startup & Hot Standby. The invalid actuation occurred due to the reactor Mode Switch traveling slightly beyond the Startup & Hot Standby position. A review of the RPS and PCIS logic schematics confirmed that any movement of the reactor Mode Switch past the Startup & Hot Standby position will interrupt the Condenser High Backpressure logic and trip the Group 1 logic. Therefore, the system actuated as designed.

## II. Assessment of Safety Consequences:

Due to the isolation of the condensate demineralizer effluent valves, the feed water suction pressure lowered to the trip set point of the feed water pumps. The plant response was as expected for a loss of feed water transient as described in Updated Final Safety Analysis Report (UFSAR) Chapter 15.1. The analyzed loss of feed water transient assumes HPCI is not able to operate. However, in this case, HPCI remained operable and injected in conjunction with RCIC after the initial loss of feed water and manual scram.

As reactor water level recovery was in progress, HPCI was manually tripped to reduce cooldown rate. To further reduce the cooldown rate, the main steam lines were manually isolated. Reactor level continued to rise and RCIC eventually tripped on high level. A decision was made to continue controlling reactor level with RCIC, even though feed water was available through the condensate demineralizer bypass. RCIC was manually restarted initially to control reactor pressure and subsequently to control level and pressure by transferring RCIC pump discharge from condensate storage tanks to the reactor vessel. RCIC was primarily used to reduce reactor pressure and maintain level over the following 13 hours.

An immediate investigation of the event determined that the plant and operator response was as expected. Therefore, this event was of very low safety significance and had no impact on public health or safety. There were no systems, structures, or components inoperable at the time of the event that contributed to the event. There were no radiological releases associated with this event.

This event did not result in a Safety System Functional Failure.

## III. Cause of Event:

A root cause evaluation was completed for the manual scram event and the following root and contributing causes were determined:

Root Cause: Brittle fracture of a condensate demineralizer in-line air filter bowl due to heat related degradation.

Contributing Cause: Organizational failure to recognize risk associated with using a non-standard alteration of filter bowl assembly.

For the invalid PCIS Group 1 isolation event, the cause was from the reactor Mode Switch traveling slightly beyond the Startup & Hot Standby position.

## IV. Corrective Actions:

Immediate Corrective Action

Prior to plant restart, repairs to the air supply to the condensate demineralizer were completed under EC 293108 and work order 40660355. This modification removed the in-line air filter and replaced it with a piece of tubing per the applicable design specifications.

| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. LER NUMBER | | |
|---|---|---|---|---|
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Corrective Actions to Prevent Recurrence for Manual Scram Event

Revise component criticality for in-line air filters that could cause a plant transient or unplanned Limiting Condition for Operability as Single Point Vulnerabilities.

Corrective Actions for Invalid Group 1 Isolation

Train Licensed Operators on risk mitigating strategies when operating the reactor Mode Switch.

## V. Additional Information:

Previous Similar Occurrences:

A review of NextEra Energy Duane Arnold LERs from the previous 5 years identified the following event:

LER 2018-004 – Automatic Reactor Scram due to Feedwater Regulating Valve Failure

EIIS System and Component Codes:

LD – Instrument Air Supply System

Reporting Requirements:

This activity is being reported pursuant to the requirements of 10 CFR 50.73(a)(2)(iv)(A).